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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Miller et al. Attorney Docket No.: GENSP033

Patent: 6,847,365 B1 09,476,761 Issued: January 25, 2005

Title: SYSTEMS AND METHODS FOR EFFICIENT PROCESSING OF MULTIMEDIA DATA

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as first-class mail on March 29, 2005 in an envelope addressed to the Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313-1450.

Signed: _____
Aurelia M. Sanchez

REQUEST FOR CERTIFICATE OF CORRECTION OF OFFICE MISTAKE (35 U.S.C. §254, 37 CFR §1.322)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450
Attn: Certificate of Correction

Dear Sir:

Attached is Form PTO-1050 (Certificate of Correction) at least one copy of which is suitable for printing. The errors together with the exact page and line number where they occur, and shown correctly in the application filed, are as follows:

SPECIFICATION:

1. Column 3, line 48, change "fall-motion" to --full-motion--. This appears correctly in the patent application as filed on January 3, 2000, on page 4, line 30.

2. Column 13, line 14, change "MELM_CTRL" to --MEM_CTRL--. This appears correctly in the patent application as filed on January 3, 2000, on page 17, line 32.

CLAIMS:

1. In line 2 of claim 3 (column 19, line 4) change "signal instruction" to --single instruction--. This appears correctly in Amendment E as filed on August 19, 2004, on page 3, paragraph 2, line 2, as claim 26.

2. In line 3 of claim 3 (column 19, line 5) change "(SIDM)" to --(SIMD)--. This appears correctly in Amendment E as filed on August 19, 2004, on page 3, paragraph 2, line 2, as claim 26.

3. In line 1 of claim 8 (column 19, line 28) change "wherein the" to --wherein when the--. This appears correctly in Amendment E as filed on August 19, 2004, on page 4, paragraph 1, line 1, as claim 31.

4. In line 5 of claim 8 (column 19, line 32) change "color based" to --color images based--. This appears correctly in Amendment E as filed on August 19, 2004, on page 4, paragraph 1, line 3, as claim 31.

5. In line 8 of claim 10 (column 19, line 53) change "data in to" to --data in the--. This appears correctly in Amendment E as filed on August 19, 2004, on page 4, paragraph 3, line 6, as claim 33.

6. In line 4 of claim 15 (column 20, line 28) change "said standardized" to --said first standardized--. This appears correctly Amendment E as filed on August 19, 2004, on page 6, paragraph 1, line 1, as claim 38.

7. In line 5 of claim 15 (column 20, line 29) change "compressed" to --format compressed--. This appears correctly in Amendment E as filed on August 19, 2004, on page 6, paragraph 1, line 1, as claim 38.

8. In line 13 of claim 16 (column 20, line 55) change "for tasks for" to --tasks for--. This appears correctly in Amendment E as filed on August 19, 2004, on page 6, paragraph 2, line 10, as claim 39.

9. In line 16 of claim 16 (column 20, line 58) change "speed efficiency" to --speed and efficiency--. This appears correctly in Amendment E as filed on August 19, 2004, on page 6, paragraph 2, line 12, as claim 39.

10. In line 3 of claim 21 (column 22, line 5) change "wherein said" to --wherein when said--. This appears correctly in Amendment E as filed on August 19, 2004, on page 8, paragraph 1, line 3, as claim 44.

Patentee hereby requests expedited issuance of the Certificate of Correction because the error lies with the Office and because the error is clearly disclosed in the records of the Office. As required for expedited issuance, enclosed is documentation that unequivocally supports the patentee's assertion without needing reference to the patent file wrapper.

It is noted that the above-identified errors were printing errors that apparently occurred during the printing process. Accordingly, it is believed that no fees are due in connection with the filing of this Request for Certificate of Correction. However, if it is determined that any fees are due, the Commissioner is hereby authorized to charge such fees to Deposit Account 500388 (Order No. GENSP033).

Respectfully submitted,
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Figure 2 is a block diagram depicting a media processing system that includes a media processor in accordance with the invention;

Figure 3 is a block diagram of the media processor of Figure 2;

Figure 4 is a more detailed block diagram of one of the processing elements shown in Figure 3;

Figure 5 is a diagram of a very long instruction word that may control various processing units that are part of a processing element;

Figure 6 is a diagram of the different data types that may be used by a media processor in accordance with the invention;

Figure 7 is a more detailed block diagram of an arithmetic logic unit (ALU) in accordance with the invention;

Figure 8 is a diagram of a first pixel and a second pixel being combined in accordance with the invention;

Figure 9 is a more detailed block diagram of a multiply unit (MUL) in accordance with the invention; and

Figure 10 is a block diagram of two pixels being multiplied together in accordance with the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The invention is directed to a novel processing architecture, and more particularly to a processing architecture that can decompress and process video data at or near the same time to generate multimedia images. It is in this context that the invention will be described. It will be appreciated, however, that the system and method in accordance with the invention has greater utility.

Figure 1 is a general block diagram of a system 20 configured to decompress and process digital data to generate multimedia data in accordance with the invention. The system preferably includes a compressed image generator 25, such as a hard disc drive, a cable television system, a satellite receiver, or a CD or DVD player, that can generate or provide a digital compressed media stream. System 20 also includes a display system 26 for displaying decompressed full-motion images. The compressed media stream, that may include audio and visual data, enters a media processing system 30 configured to decompress the compressed media stream. In addition, media processing system 30 also may process digital data contained in the compressed data stream or in another storage device or digital data source, at the same time as it

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            st_s        left_adx, xybase        ; setup start address of pixels
            mv_v        left_pix, cur_pix       ; scratch value for current pix
hloop:
{           st_p        cur_pix, (xy)           ; write left hand pixel
            add_p       h_pix_inc, cur_pix      ; calc next pixel
            addr        #1,rx                   ; point to next pixel to right
            dec         rc0                     ; decrement pixel counter
            bra         c0ne, hloop, nop        ; loop until span done
}
endspan:
            add         left_adx_inc, left_adx  ; next line left edge
{           add         width_inc, width        ; next line width
            dec         rc1                     ; decrement vertical counter
}
{           addp        v_pix_inc, left_pix     ; left pix start value
            bra         c1ne, vloop, nop
}
end:
```

As shown, all of the instructions within the "hloop" may be executed in a single clock cycle, thus reducing the time required to perform Gouraud shading on an image composed of triangles.

Figure 5 is a diagram of an example very long instruction word (VLIW) 140, in accordance with the present invention. The VLIW instructions may be of variable length and may contain an instruction word for any or all of the processing units, so that for every clock cycle, each processing unit may execute a separate instruction. For example, VLIW 140 may contain an ECU_CTRL instruction word 142 for controlling ECU unit 106, a MUL_CTRL instruction word 144 for controlling MUL unit 114, an ALU_CTRL instruction word 146 for controlling ALU unit 112, an RCU_CTRL instruction word 148 for controlling RCU unit 110, and a MEM_CTRL instruction word 150 for controlling MEM unit 108. The ECU_CTRL MUL_CTRL, and the ALU_CTRL instructions may be of variable length, and are shown here for purpose of example as each being 32 bits long. The RCU_CTRL and MEM_CTRL instructions also may be of variable length, and are shown here for purpose of example as each being 16 bits long. The length of each of these instructions typically varies depending on the processing unit. In this example, the length of the complete VLIW 140 is 128 bits. The length of any VLIW depends on the number of processing units being used, and whether or not the VLIW has been compressed in any manner.

Referring now to Figure 6, a diagram illustrating the various data types that are supported by media processor 32 and by each MPE 66-72 is shown. The simplest data type is a scalar type 160 that preferably is a 32-bit scalar value. Scalar type 160 may

a data stream parser unit coupled to the memory unit arranged to parse the digital data into a number of sub-data streams each being suitable for processing by selected MPEs.

26. (previously presented) A system as recited in claim 24, wherein each of the MPEs is a single instruction stream, multiple data stream (SIMD) general purpose very long word (VLIW) RISC processor capable of operating independently of the other MPEs.

27. (previously presented) A system as recited in claim 24 wherein, based upon a signal provided by the processor control element, selected ones of the MPEs cooperatively perform a particular task.

28. (previously presented) A system as recited in claim 27, wherein when the particular task is selected from a group that includes graphics processing, database searching, numerical processing, and video processing.

29. (previously presented) A system as recited in claim 28, wherein the digital data is stored on an external medium in a format consistent with a particular external medium.

30. (previously presented) A system as recited in claim 29, wherein the external medium includes a compact disc (CD), a laser disc (LD), a digital versatile disc (DVD) and wherein the respective formats include a compressed audio format, a first type compressed video and first type compressed audio format, and a second type compressed video format and a second type compressed audio format such that the universal media processor identifies the particular format and reconfigures selected ones of the MPEs accordingly in order to successfully process the corresponding digital data.

31. (previously presented) A system as recited in claim 29 wherein when the particular task is processing an MPEG-2 video stream, the process element controller directs selected MPEs to decode the MPEG-2 data, other selected MPEs to generate full motion color images based upon the decoded MPEG-2 data, other MPEs to generate audio streaming data.

32. (previously presented) A system as recited in claim 24, wherein the memory device includes a main system memory, and wherein the number of busses includes,

a main system bus coupled to the main system memory;

a supplemental bus separate from the main system bus arranged to communicate with the main system memory capable of providing linear data transfers; and

a communication bus used to transfer data packets between selected ones of the MPEs and/or provides a link between the MPEs and a selected one of a number of peripheral devices.

33. (previously presented) A method of processing digital data by a media processing system, comprising:

receiving the digital data;

determining a digital data format associated with the received digital data;

configuring selected ones of a number of configurable media processing elements (MPE) in order to process the digital data in the appropriate format;

dynamically configuring at least one of said configurable MPEs to act, at least in part, as a control processing element suitably arranged to control the distribution of said digital data between some or all of the MPEs, schedule tasks for the MPEs, wherein each of the distributed MPEs process a selected portion of the digital data in concert with the other MPEs thereby increasing the overall speed and efficiency of the media processing system; and

processing said digital data that includes said first standardized format compressed video data to produce compressed video images and image data;

decoding said first standardized format compressed video images to generate full motion video pixel data by selected ones of the MPEs;

sharing a DRAM between said MPEs; and

producing a full motion video signal from said full motion video pixel data, wherein the selected ones of the MPEs used for decoding the first standardized format compressed video images is adapted for reconfiguration to decode digital data including data that is compressed in a second standardized format.

39. (previously presented) Computer program product for processing digital data by a media processing system, comprising:

computer code for receiving the digital data;

computer code for determining a digital data format associated with the received digital data;

computer code for configuring selected ones of a number of media processing elements (MPE) in order to process the digital data in the appropriate format;

computer code for dynamically configuring at least one of said configurable MPEs to act, at least in part, as a control processing element suitably arranged to control the distribution of said digital data between some or all of the MPEs, schedule tasks for the MPEs, wherein each of the distributed MPEs process a selected portion of the digital data in concert with the other MPEs thereby increasing the overall speed and efficiency of the media processing system;

computer code for outputting the processed digital data; and

computer readable medium for storing the computer code.

44. (previously presented) Computer program product as recited in claim 43, further comprising:

wherein when said digital video data is compressed in a first standardized format,

computer code for processing said digital data that includes said first standardized format compressed video data to produce compressed video images and image data;

computer code for decoding said first standardized format compressed video images to generate full motion video pixel data by selected ones of the MPEs;

computer code for sharing a DRAM between said MPEs; and

computer code for producing a full motion video signal from said full motion video pixel data, wherein the selected ones of the MPEs used for decoding the first standardized format compressed video images is adapted for reconfiguration to decode digital data including data that is compressed in a second standardized format.

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(Also Form PT-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,847,365 B1

DATED : January 25, 2005

INVENTOR(S) : Miller et al.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Specifications:

Column 3, line 48, change "fall-motion" to --full-motion--.

Column 13, line 14, change "MELM_CTRL" to --MEM_CTRL--.

In the Claims:

In line 2 of claim 3 (column 19, line 4) change "signal instruction" to --single instruction--.

In line 3 of claim 3 (column 19, line 5) change "(SIDM)" to --(SIMD)--.

In line 1 of claim 8 (column 19, line 28) change "wherein the" to --wherein when the--.

In line 5 of claim 8 (column 19, line 32) change "color based" to --color images based--.

In line 8 of claim 10 (column 19, line 53) change "data in to" to --data in the--.

In line 4 of claim 15 (column 20, line 28) change "said standardized" to --said first standardized--.

In line 5 of claim 15 (column 20, line 29) change "compressed" to --format compressed--.

In line 13 of claim 16 (column 20, line 55) change "for tasks for" to --tasks for--.

In line 16 of claim 16 (column 20, line 58) change "speed efficiency" to --speed and efficiency--.

In line 3 of claim 21 (column 22, line 5) change "wherein said" to --wherein when said--.

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